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Regulation of Gene Expression for L-Isoaspartyl O-Methyltransferases by Cis-Elements Associated with “Heat-Shock Polytene Chromosome Puffing Formation” in the Anhydrobiotic Midge

Deviatiiarov R., Shagimardanova E., Kikawada T.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2016, Springer Science+Business Media New York.L-isoaspartyl O-methyltransferases (PIMTs) are known mostly because of their protein chain reparation activity in plant seeds, but also in many other organisms, from bacteria to mammals, including human. The main function of PIMT is recognition and methylation of spontaneously isomerized aspartate residue (Asp) in the amino acid sequences of cellular proteins, and thus preventing their conformation shifts and subsequent inactivation or loss of particular functions. The correlation between PIMT activity and accumulation of isomerized aspartate residues is well studied and used as a marker of isoAsp presence, whereas regulation pathways of PIMT genes are not clear yet. In our study, we propose a possible model for multiple paralogous PIMT gene regulation in the genome of an anhydrobiotic insect Polypedilum vanderplanki. Analysis of promoter regions revealed that PIMT genes possess enriched motif nearby +1 site, associated with GO term heat-shock polytene chromosome puffing. Poly(ADP-ribose) polymerase (PARP) is involved in this process of chromatin loosening and subsequent transcription activation of related genes. This result implied that expression of PIMT genes in P. vanderplanki could be regulated by chromatin modification.

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Keywords

PARP (poly(ADP-ribose) polymerase), PIMT (L-isoaspartyl O-methyltransferase), Polypedilum vanderplanki, Transcription regulation

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